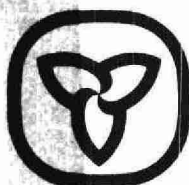


NANTICOKE WATER CHEMISTRY

1977



Ontario

Ministry
of the
Environment

The Honourable
Harry C. Parrott, D.D.S.,
Minister

Graham W. S. Scott,
Deputy Minister

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NANTICOKE WATER CHEMISTRY

1977

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December, 1978

SUMMARY

The water quality monitoring, which was started at Nanticoke in 1969, was continued in 1977. Measured parameters did not differ much from those reported for the previous years. The area was still spatially homogeneous and showed temporal variations. Tests of long-term trends (1969-1977) were expanded and included comparison with several offshore stations in Lake Erie. Nearshore and offshore concentrations for turbidity, chloride and ammonia decreased slightly while the sum of nitrates and nitrites increased. Several declines in the nearshore values of secchi disc depths, chlorophyll a, conductivity, dissolved P and Kjeldahl N were determined. Nearshore concentrations of total N and total P did not change significantly, but offshore concentrations of total P declined and total N increased. Generally the changes are small and their absolute values tend to decrease with increasing length of the record.

INTRODUCTION

The continuity of the sampling program is an important feature of the Nanticoke project. With nine years of an uninterrupted sampling, changes can be detected and the long-term trends can be analyzed with more confidence. The large data base also ensures that any future changes in the area which can be attributed to the direct or indirect influence of the nearshore industrialization will be detected.

SURVEY OPERATION

The same 10 sampling stations as used in previous years were sampled eight times in 1977. The sampling station locations are shown in Figure 1. Water samples at stations 112, 501, 648, 810, 994, 1016 and 1041 were collected at 1 m below surface and 1 m off the bottom. Stations 518, 1040 and 1042 were sampled at mid-depth. As before, most of the analyses for the 20 water quality parameters monitored were done in the Ministry of Environment's Laboratory in Toronto. Temperature and dissolved oxygen were measured in situ.

ANALYSIS OF DATA

The individual results of the surveys are listed in Appendix I, Tables 1-20. The data for the individual sampling dates and individual stations are listed, together with the means and standard deviations for the stations and for the dates. The overall mean values are summarized in Tables 1 and 2. Most of the standard deviations for the station means are larger than the standard deviations for the date means, suggesting that there is more variation between the individual sampling dates than there is between stations on a given date. This statement can be rigorously tested by an analysis of variance. The results of a two way analysis of variance are shown in Table 3. The between date differences are significant for the majority of parameters. The only noted exceptions are for the bottom samples of total P,

filtered reactive P, total Kjeldahl N and phenol concentrations. The lack of temporal differences for the bottom samples can be attributed to the relative insulation of the bottom waters. Phenol data (Appendix 1, Table 20) are not typical as the most common value given (0.1 ug/L) is actually the instrument detection limit. The significance of the between-date differences confirms what had been found in the previous years; that is, that the water chemistry parameters change significantly throughout the season.

The between station differences as given in Table 3 show are generally not significant with the single exception of secchi disc depth. In this case, the deeper stations (112, 501, 648) show larger secchi disc depths than inshore stations. Overall, the previous years findings were confirmed and the area is spatially homogeneous.

It had been noted in the previous years that some of the water quality parameters measured in the area were changing. These changes are very small but could be significant in the long run. As the main objective of the Nanticoke project is to determine the influence of the industrialization of the area on the complete ecosystem, this point is important. Other significant questions are whether or not the changes are harmful or beneficial, (as for example, decrease of conductivity shown in previous year's reports) and what are their causes. To study the effect and of changes in Lake Erie chemistry in general on the nearshore waters, changes in the water quality parameters in the main body of Lake Erie were analyzed as well.

Data obtained by the Canada Centre for Inland Waters (CCIW) on annual cruises of Lake Erie were provided for the Lake Erie area adjacent to the Nanticoke project station locations. The area was limited by latitudes $42^{\circ} 40' 00''$ and $42^{\circ} 55' 00''$ N and longitudes $79^{\circ} 55' 00''$ to $80^{\circ} 15' 00''$ W. Data for each parameter collected in this area on each date were averaged to get the value for the date. This new data set was then used to perform

a trend analysis similar to that carried out for the Nanticoke area. The details of the program used in the trend analysis were given in the 1976 Nanticoke Water Chemistry report.

Results of the trend analysis of local and offshore data are shown in Table 4 and Figure 2. The results for the regular Nanticoke data stations (Figure 1) are marked as local; the CCIW data are marked as offshore. The differences between the two areas are most evident from Figure 2. In this figure the full circles denote the average change in percent of the average value for 1969-1977 per year for local stations, with full lines denoting their 95% confidence limits. Similarly the open circles and broken lines are average changes and limits of the offshore stations.

During these nine years the dissolved oxygen changed very little in both areas and considering the limits no significant changes have happened. The average dissolved oxygen level is at 98.4 percent saturation which means that there is no dissolved oxygen problem anywhere in the area. During the same time period, the secchi disc depth decreased significantly in the nearshore zone by an average of about 5.7% per year. On the other hand, the secchi disc depth of the offshore waters did not change significantly. It is interesting to note that at the same time the average turbidity of the nearshore waters declined. Of course, the variation of measured turbidities is rather high.

The change in the measured phytoplankton crop at the nearshore locations (Figure 2) is not significantly different from zero. There is a wide discrepancy between chlorophyll a data at the nearshore and offshore areas. The nearshore area concentrations averaged 2.43 ug/L while the offshore was higher at 3.64 ug/L. Local chlorophyll a data indicate decreasing trend while the offshore values have been varying widely, with changes in a range from about -9.7 to + 17% per year. Some of these differences can be attributed to the fact that offshore chlorophyll a data are limited to the years 1969 to 1976 with no data available for 1974.

Annual changes in conductivity were similar in the nearshore and offshore stations with an average decline for both areas of 1.0% per year. No significance can be attached to the decline of the offshore conductivity because of the large variation in the offshore values (see Figure 2). Interestingly, the offshore values averaged 314.1 uS/cm while the nearshore data averaged 311.6 uS/cm. Whether this difference is real or is just a result of different standards and calibration practices is not known. Also interesting is that the nearshore decline from 1969 to 1976, as reported in the 1976 Nanticoke Water Chemistry report was, 1.2% per year, which is higher than the 1.06% per year reported for the nearshore data in this report. It can be seen that the longer data record changed the calculated trend to some degree. Average conductivity values for the nearshore stations are given below for each year from 1969 to 1977.

Year	1969	1970	1971	1972	1973	1974	1975	1976	1977
Average	325.6	322.0	311.9	322.6	313.0	308.2	299.0	300.9	301.7
Conductivity									
uS/cm									

It appears that the decrease in conductivity from 1969 to 1975 has slowed in recent years and that actually there is a small increase in conductivity from 1975 to 1977. Further data should clarify this trend.

It is also interesting to note that the chloride concentrations have decreased in both the nearshore and offshore zones. Their decrease, which averaged about 3.6% per year, is larger than the change in conductivity, suggesting that the long term decline in conductivity can be attributed at least partially to the decline in chloride concentrations.

Yearly change in the total phosphorus in the nearshore zone does not differ significantly from zero (Figure 2, Table 4). In contrast to this, the total P concentrations in the offshore zone declined by 14.8 percent per year on the average. This can be at least partially explained by unusually high offshore values of total P determined in 1970 and 1971 cruises with only limited numbers of samples collected at that time. Also, perhaps due to these few samples, the offshore levels averaged 0.024 mg P/L while the nearshore data averaged only 0.017 mg P/L. Somewhat different results were found for concentrations of dissolved (filtered reactive) phosphorus in the nearshore zone, which declined over the years by 8.4 percent per year. The offshore trend of dissolved P cannot be determined as only data for 1970 and 1971 are available.

Somewhat different changes were found for nitrogen. The change in total nitrogen (total filtered N) of the nearshore zone is not significantly different from zero. At the same time, the concentrations of total N increased in the offshore zone. However, the analysis for the offshore area is not very reliable because the number of samples is limited, and there are no data available for 1969, 1974, 1976 and 1977. Total Kjeldahl N, determined only in the nearshore area, has declined. There has been a considerable increase of nearly 11 percent per year in the concentrations of nitrate and nitrite in both near and offshore zones. Increases in NO_3^- plus NO_2^- were compensated by a decrease in the concentration of ammonia in both zones at the same time.

Overall, some changes in the water chemistry in the area have been detected and quantified but still more work is required to increase the confidence of these findings and to find the reasons for these changes.

CONCLUSIONS

The 1977 data are generally similar to data collected in 1976. Significant long term trends have been detected for nearshore and offshore turbidity, chloride, the sum of nitrate and nitrite, and ammonia. Significant changes were also found for nearshore secchi disc depths, chlorophyll a, conductivity, dissolved P, total N and Kjeldahl N. Offshore total P and total N have also changed significantly. So far decreases in the measured values are more common than increases. The exceptions are the increases in total N and sum of nitrate and nitrite.

TABLE 1
Summary of Results, Mean Value per Station, 1977, Nanticoke Water Chemistry

Stn.No.		Temp °C	BOD ₅ mg/L	Cond μS/cm	Turb FTU	pH SU	Cl ⁻ mg/L	SO ₄ mg/L	Susp Solid mg/L	Diss Solid mg/L	Total Alk mg/L	Secc disc m	D.O. satur- ation %	Total Fe mg/L	Total P mg/L	Filt Reac P mg/L	Total Kjeld N mg N/L	Filt NO ₂ + NO ₃ mg N/L	Filt NH ₃ mg N/L	Chloro a μg/L	Phenols μg/L
112	s	14.8	0.3	304	1.0	8.25	20.9	24.8	2.4	197	96	3.6	103	0.08	0.012	0.003	0.242	0.104	0.009	1.2	1.0
	b	12.2	0.6	305	1.2	8.12	20.9	24.8	2.6	198	96	-	90	0.13	0.015	0.004	0.361	0.122	0.018	-	1.3
501	s	14.6	0.4	303	1.1	8.19	20.8	25.1	2.9	197	96	3.5	105	0.08	0.012	0.003	0.245	0.096	0.010	1.3	1.2
	b	11.9	0.4	303	1.8	8.11	20.8	25.6	3.1	197	96	-	93	0.10	0.026	0.006	0.253	0.117	0.017	-	1.2
518	s	13.6	0.5	305	6.9	8.24	20.6	25.3	5.9	198	96	1.8	115	0.34	0.018	0.004	0.239	0.123	0.013	2.0	1.0
648	s	14.9	0.6	303	1.4	8.26	20.8	24.9	2.2	196	95	3.4	116	0.14	0.011	0.003	0.251	0.096	0.008	1.5	1.3
	b	13.5	0.4	303	1.4	8.22	20.9	24.8	2.7	196	96	-	108	0.11	0.012	0.003	0.249	0.102	0.009	-	1.0
810	s	12.6	0.5	305	5.2	8.20	20.6	25.5	5.8	198	96	1.8	121	0.36	0.018	0.004	0.281	0.118	0.015	2.0	1.2
	b	10.8	0.4	304	4.5	8.16	20.8	24.6	5.5	197	96	-	110	0.28	0.019	0.006	0.271	0.116	0.014	-	1.3
994	s	14.0	0.4	304	1.9	8.09	20.7	24.8	3.8	197	96	2.6	109	0.14	0.013	0.003	0.246	0.101	0.011	1.5	2.0
	b	12.0	0.4	305	2.6	8.13	20.8	25.2	3.9	197	96	-	99	0.13	0.017	0.004	0.275	0.109	0.015	-	1.5
1016	s	15.3	0.5	305	2.4	8.29	20.8	25.0	2.7	197	96	2.5	112	0.19	0.014	0.003	0.282	0.101	0.010	1.6	1.8
	b	12.7	0.3	304	4.0	8.24	20.8	24.7	4.5	197	96	-	96	0.22	0.020	0.008	0.283	0.117	0.018	-	1.5
1040	s	14.2	0.4	305	5.8	8.23	20.7	25.3	6.0	198	97	1.9	102	0.40	0.022	0.007	0.298	0.123	0.014	2.1	1.0
1041	s	13.5	0.4	304	3.1	8.27	20.9	24.9	4.9	197	96	2.0	111	0.16	0.018	0.003	0.272	0.105	0.011	2.2	1.5
	b	11.2	0.4	306	6.5	8.15	20.7	25.0	8.5	198	97	-	97	0.37	0.020	0.007	0.291	0.121	0.019	-	1.2
1042	s	12.4	0.6	305	4.5	8.27	20.8	25.3	5.5	198	98	1.7	111	0.23	0.024	0.005	0.279	0.113	0.014	2.0	1.2

s surface samples
b bottom samples

TABLE 2
Summary of Results, Area Mean Value per Date, 1977, Nanticoke Water Chemistry

Date	Temp °C	BOD ₅ mg/L	Cond μS/cm	Turb FTU	pH SU	Cl ⁻ mg/L	SO ₄ mg/L	Susp Solid mg/L	Diss Solid mg/L	Total Alk mg/L	Seco disc m	D.O. satur- ation %	Total Fe mg/L	Total P mg/L	Filt Reac P mg/L	Total Kjeld N mg N/L	Filt NO ₂ + NO ₃ mg N/L	Filt NH ₃ mg N/L	Chloro a μg/L	Phenols μg/L
Apr 20	s 8.0	0.9	315	1.6	8.26	20.9	26.3	2.1	205	99	2.7	97	0.05	0.014	0.003	0.261	0.155	0.005	2.5	1.1
	b 6.8	0.8	314	1.6	8.24	20.9	26.0	2.1	204	99	-	87	0.05	0.016	0.003	0.254	0.168	0.007	-	1.0
May 24	s 13.9	0.4	311	1.3	8.33	20.9	23.9	1.8	202	97	4.4	118	0.04	0.005	0.003	0.207	0.123	0.005	1.2	1.0
	b 6.6	0.5	310	1.2	8.12	20.9	23.6	1.6	202	96	-	104	0.04	0.010	0.004	0.251	0.147	0.009	-	1.0
June 14	s 13.7	-	310	-	-	20.9	-	-	-	-	3.0	-	-	0.008	0.001	0.226	0.108	0.007	1.3	-
	b 10.8	-	309	-	-	21.0	-	-	-	-	-	-	-	0.012	0.002	0.253	0.122	0.011	-	-
July 6	s 16.5	-	305	2.3	8.09	20.5	24.4	3.2	198	95	1.9	-	0.11	0.014	0.004	0.251	0.096	0.008	2.0	1.1
	b 13.6	-	306	2.0	7.97	20.5	24.1	3.0	199	95	-	-	0.10	0.028	0.005	0.284	0.104	0.020	-	1.3
July 26	s 18.8	-	306	2.1	-	20.5	-	-	-	-	1.5	-	-	0.017	0.003	0.337	0.087	0.021	1.4	-
	b 17.3	-	307	2.2	-	20.6	-	-	-	-	-	-	-	0.014	0.003	0.409	0.101	0.029	-	-
Aug 15	s 21.7	0.3	295	2.4	8.29	21.5	25.1	3.6	192	94	2.9	-	0.12	0.018	0.005	0.220	0.055	0.012	1.3	1.1
	b 21.6	0.2	296	2.7	8.25	21.5	25.2	4.0	193	94	-	-	0.11	0.017	0.008	0.241	0.059	0.015	-	1.3
Sept 29	s 17.0	0.5	291	10.4	8.12	19.8	24.6	6.9	190	95	1.7	-	0.58	0.033	0.008	0.381	0.112	0.015	1.0	2.2
	b 17.1	0.4	292	10.0	8.13	20.0	24.6	7.6	190	94	-	-	0.51	0.029	0.011	0.351	0.099	0.014	-	1.9
Nov 22	s 9.5	0.2	301	3.2	8.24	20.9	25.9	7.4	196	98	1.5	-	0.36	0.021	0.003	0.224	0.124	0.020	3.3	1.4
	b 8.5	0.2	300	2.3	8.26	21.0	25.6	8.0	195	97	-	-	0.36	0.020	0.007	0.223	0.117	0.021	-	1.3

s surface samples
b bottom samples

TABLE 3

Two-way Analysis of Variance, Nanticoke 1977

Parameter	Depth	Between Dates Difference				Between Stations Difference			
		Fij	i	j	Significance at a 5% level	Fij	i	j	Significance
Water Temperature	s	192.2	7	9	SD	0.62	9	7	NSD
	b	219.1	7	6	SD	3.14	6	7	NSD
BOD ₅	s	19.99	7	9	SD	1.38	9	7	NSD
	b	11.51	7	6	SD	1.37	6	7	NSD
Conductivity	s	137.6	7	9	SD	1.77	9	7	NSD
	b	126.9	7	6	SD	3.31	6	7	NSD
Chloride	s	25.0	7	9	SD	0.65	9	7	NSD
	b	35.5	7	6	SD	1.43	6	7	NSD
Sulphate	s	57.6	7	9	SD	1.96	9	7	NSD
	b	49.9	7	6	SD	2.30	6	7	NSD
Turbidity	s	6.56	7	9	SD	2.07	9	7	NSD
	b	4.35	7	6	SD	1.81	6	7	NSD
Secchi Disc Depth		19.6	7	9	SD	10.0	9	7	SD
Suspended solids	s	9.53	7	9	SD	2.45	9	7	NSD
	b	4.41	7	6	SD	2.26	6	7	NSD
Chlorophyll <u>a</u>	s	7.56	7	9	SD	1.05	9	7	NSD
Dissolved Oxygen	s	79.4	7	9	SD	1.50	9	7	NSD
	b	31.2	7	6		1.25	6	7	NSD
Total P	s	12.8	7	9	SD	2.61	9	7	NSD
	b	2.12	7	6	NSD	0.90	6	7	NSD
Filtered Reactive P	s	5.45	7	9	SD	1.66	9	7	NSD
	b	2.07	7	6	NSD	0.82	6	7	NSD

TABLE 3 continued

Parameter	Depth	Between Dates Difference				Between Stations Difference			
		Fij	i	j	Significance at a 5% level	Fij	i	j	Significance
Total Kjeldahl N	S	19.5	7	9	SD	1.73	9	7	NSD
	b	2.84	7	6	NSD	1.12	6	7	NSD
Filtered NO ₂ + NO ₃	S	13.5	7	9	SD	1.36	9	7	NSD
	b	18.0	7	6	SD	0.94	6	7	NSD
Filtered NH ₃	S	20.6	7	9	SD	1.83	9	7	NSD
	b	7.74	7	6	SD	1.99	6	7	NSD
pH	S	9.56	7	9	SD	2.31	9	7	NSD
	b	8.85	7	6	SD	1.43	6	7	NSD
Total alkalinity	S	33.5	7	9	SD	1.09	9	7	NSD
	b	23.2	7	6	SD	0.17	6	7	NSD
Total Fe	S	8.00	7	9	SD	1.49	9	7	NSD
	b	5.27	7	6	SD	1.32	6	7	NSD
Phenols	S	3.12	7	9	NSD	1.20	9	7	NSD
	b	2.02	7	6	NSD	0.64	6	7	NSD

SD - means significant difference

NSD - means no significant difference

S - surface samples

b - bottom samples

TABLE 4

Long-Term Changes of the Physical-Chemical Parameters,
Nanticoke 1969-1977

Parameter	Average Value 1969-1977		Average Change %/year						Significance		Trend	
	Local	Offshore	Local			Offshore			Local	Off	Local	Off
			Mean	Min.	Max.	Mean	Min.	Max.				
Conductivity $\mu\text{S}/\text{cm}$	311.6 ± 1.3	$314.1^d \pm 0.99$	-1.06	-0.9	-1.22	-0.99	-2.49	0.52	S	NS	D	-
Chloride mg/L	23.0 ± 0.3	22.1 ± 0.4	-3.21	-3.67	-2.75	-3.95	-3.01	-4.81	S	S	D	D
Total P $\text{mg}/\text{P}/\text{L}$	0.0171 ± 0.0010	0.0237 ± 0.0018	-1.40	-3.63	0.83	-14.8	-17.8	-11.8	NS	S	-	D
Dissolved P (soluble reactive P) $\text{mg P}/\text{L}$	0.0052 ± 0.0006	$0.0188^f \pm 0.0004$	-8.42	-12.68	-4.16	-	-	-	S	-	D	-
Total N $\text{mg N}/\text{L}$	0.394 ± 0.015	$0.220^g \pm 0.005$	0.48	-0.85	1.80	8.31	4.78	11.84	NS	S	-	I
Kjeldahl N $\text{mg N}/\text{L}$	0.294 ± 0.010		-2.35	-3.59	-1.10		S		D			
Ammonia $\text{mg N}/\text{L}$	0.0269 ± 0.0045	$0.0217^b \pm 0.0012$	-18.6	-24.8	-12.3	-8.01	-11.2	-4.83	S	S	D	D
Nitrate + Nitrite $\text{mg N}/\text{L}$	0.0997 ± 0.0112	$0.111^c \pm 0.005$	10.74	7.12	14.37	11.73	9.28	14.2	S	S	I	I
Nitrate $\text{mg N}/\text{L}$	$0.0851^c \pm 0.0126$		13.83	7.52	20.15				S		I	
Nitrite $\text{mg N}/\text{L}$	$0.0042^c \pm 0.0003$		-2.02	-5.61	1.59				NS		-	
pH	8.23 ± 0.06	$8.32^e \pm 0.01$	0.07	-0.18	0.33	-1.81	-6.27	2.65	NS	NS	-	-
Phytoplankton Crop ASU/mL	348.3 ± 37.7		-0.72	-4.24	2.81				NS		-	
Chlorophyll a $\mu\text{g}/\text{L}$	2.43 ± 0.24	$3.64^d \pm 0.73$	-8.33	-4.19	-12.47	3.95	-9.73	17.6	S	NS	D	-

Table 4 continued

Parameter	Average Value 1969-1977		Average Change %/year			Offshore			Significance		Trend	
	Local	Offshore	Local			Mean	Min.	Max.	Local	Off	Local	Off
			Mean	Min.	Max.							
Dissolved O ₂ % saturated mg/L	98.4 ± 2.0	10.48 ± 0.23	0.08	-1.31	1.48	0.24	-0.60	1.07	NS	NS	-	-
Turbidity FTU	3.67 ± 0.42	3.94 ^c ± 0.94	-4.27	-8.00	-0.53	50.8	34.1	67.4	S	S	D	D
Secchi Disc Depth m	2.85 ± 0.22	3.31 ± 0.16	-5.67	-8.42	-2.91	0.53	-1.66	2.72	S	NS	D	-
Water Level at Port Dover m	174.33 ± 0.04		0.02	0.01	0.03				S	I		

a - Data limited to 1969-1973

b - Data limited to 1969-1974

c - Data limited to 1969-1975

d - Data limited to 1969-1976

e - Data limited to 1971-1975

f - Data limited to 1970-1971

g - Data limited to 1970-1975

S - Significant long-term change

NS - No significant long-term change

D - Long-term decrease

I - Long-term increase

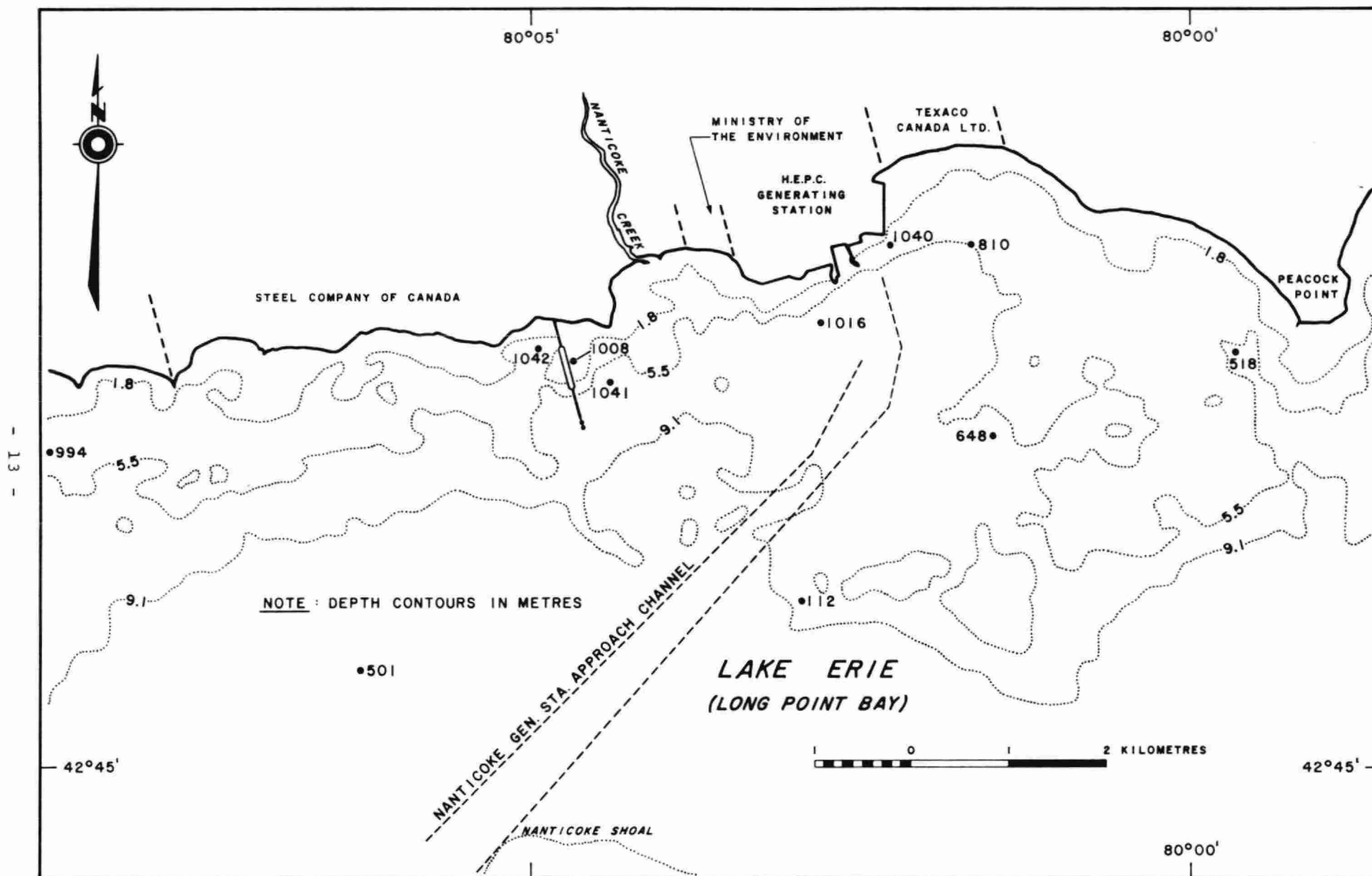


FIGURE 1 - 1977 NANTICOKE SAMPLING STATIONS.

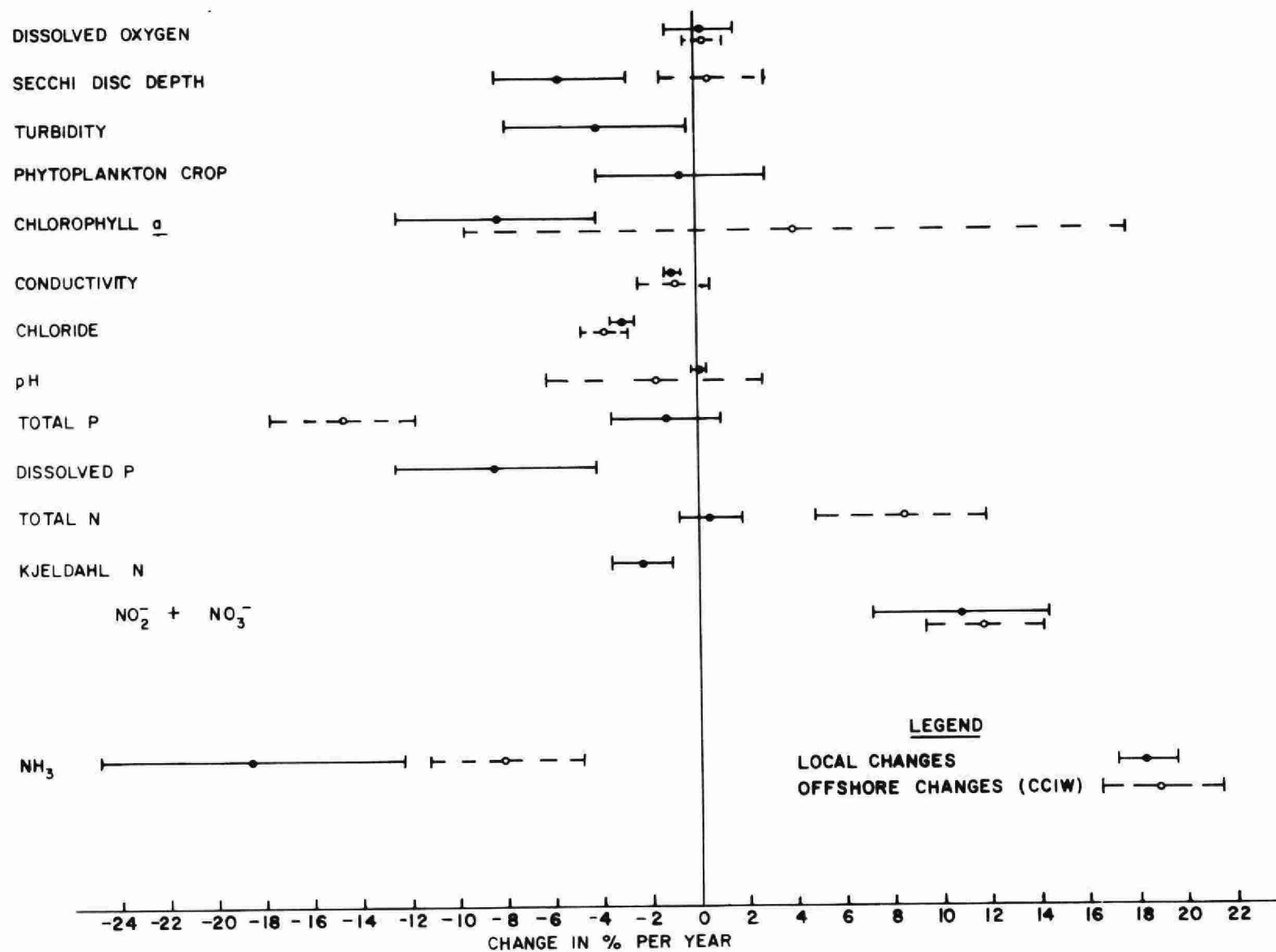


FIGURE 2 NANTICOKE, LAKE ERIE, LONG TERM CHANGES, 1969-1977

APPENDIX I

APPENDIX I, TABLE 1, NANTICOKE 1977

WATER TEMPERATURE DEG. C

STATION	DEPTH M	APR 20	MAY 24	JUN 14	JUL 6	JUL 26	AUG 15	SEP 29	NOV 22	MEAN	ST. DEV.
*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****
112	1.0	5.0	15.8	14.1	17.0	19.5	21.3	17.0	9.0	14.8	5.41
112	11.0	5.0	5.8	8.9	14.8	16.2	21.0	17.2	9.0	12.2	5.84
501	1.0	5.0	15.2	12.9	16.7	19.5	21.2	17.1	9.0	14.6	5.41
501	12.0	5.5	5.5	8.0	11.9	16.2	21.9	17.5	8.5	11.9	6.08
518	3.0	9.0	12.0	13.0	16.5	19.0	****	17.0	8.5	13.6	4.07
648	1.0	6.0	15.2	14.0	17.0	19.5	21.3	17.1	9.0	14.9	5.16
648	7.0	6.0	7.9	11.2	15.5	19.5	21.8	17.3	9.0	13.5	5.81
810	1.0	8.5	12.9	15.3	****	****	****	17.2	9.0	12.6	3.82
810	8.0	7.5	7.8	12.2	****	****	****	17.0	9.5	10.8	3.94
994	1.0	9.5	15.2	13.8	16.0	****	21.2	****	8.5	14.0	4.64
994	7.0	9.5	7.2	13.0	12.9	****	21.1	****	8.2	12.0	5.07
1016	1.0	9.5	14.5	13.5	17.0	19.0	23.0	17.1	8.5	15.3	4.82
1016	9.0	7.0	6.0	11.0	13.0	17.3	22.0	17.1	8.0	12.7	5.73
1040	3.0	9.5	10.2	13.2	15.2	18.1	22.0	16.9	8.5	14.2	4.72
1041	1.0	8.5	13.5	13.5	17.0	17.3	****	16.8	8.0	13.5	3.93
1041	9.0	7.0	5.8	11.0	13.5	17.2	****	16.8	7.0	11.2	4.78
1042	2.0	10.0	15.0	13.5	****	****	****	16.6	7.0	12.4	3.89
*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****
MEAN	SURFACE	8.0	13.9	13.7	16.5	18.8	21.7	17.0	8.5	14.1	4.48
	BOTTOM	6.8	6.6	10.8	13.6	17.3	21.6	17.1	8.5	12.1	5.20
ST DEV	SURFACE	1.95	1.79	0.69	0.65	0.84	0.72	0.19	0.62	13.3	4.87
	BOTTOM	1.50	1.03	1.75	1.33	1.35	0.47	0.24	0.82	****	*****

**** MEANS THAT THE RESULT IS NOT AVAILABLE

APPENDIX I, TABLE 2 , NANTICOKE 1977

CONDUCTIVITY AT 25 DEG.C. US/CM

STATION	DEPTH M	APR 20	MAY 24	JUN 14	JUL 6	JUL 26	AUG 15	SEP 29	NOV 22	MEAN	ST.DEV.

112	1.0	310.	310.	310.	304.	305.	295.	295.	300.	304.	6.39
112	11.0	315.	310.	310.	304.	310.	300.	295.	299.	305.	6.93
501	1.0	310.	312.	305.	303.	305.	295.	295.	300.	303.	6.27
501	12.0	310.	310.	305.	308.	306.	295.	293.	300.	303.	6.63
518	3.0	320.	310.	310.	305.	307.	295.	290.	303.	305.	9.32
648	1.0	310.	310.	310.	305.	305.	295.	292.	299.	303.	7.13
648	7.0	310.	310.	310.	305.	305.	295.	293.	299.	303.	6.91
810	1.0	315.	310.	310.	310.	307.	295.	288.	304.	305.	9.01
810	8.0	315.	310.	310.	305.	307.	295.	288.	302.	304.	8.82
994	1.0	315.	312.	310.	305.	306.	295.	290.	298.	304.	8.77
994	7.0	315.	310.	310.	307.	305.	295.	295.	299.	305.	7.45
1016	1.0	320.	310.	310.	305.	307.	295.	290.	300.	305.	9.47
1016	9.0	315.	310.	310.	305.	307.	295.	290.	299.	304.	8.49
1040	3.0	320.	310.	310.	305.	306.	295.	290.	304.	305.	9.27
1041	1.0	315.	312.	310.	305.	307.	295.	290.	300.	304.	8.65
1041	9.0	315.	312.	310.	307.	308.	300.	290.	302.	306.	7.96
1042	2.0	315.	315.	310.	****	307.	295.	290.	303.	305.	9.64

MEAN	SURFACE	315.	311.	310.	305.	306.	295.	291.	301.	304.	7.99
	BOTTOM	314.	310.	309.	306.	307.	296.	292.	300.	304.	7.26
ST DEV	SURFACE	4.08	1.66	1.58	1.92	0.92	0.0	2.31	2.18	304.	7.67
	BOTTOM	2.44	0.76	1.89	1.46	1.77	2.44	2.71	1.41	****	*****

**** MEANS THAT THE RESULT IS NOT AVAILABLE

APPENDIX I, TABLE 3, NANTICOKE 1977

DISSOLVED SOLIDS MG/L

STATION	DEPTH M	APR 20	MAY 24	JUN 14	JUL 6	JUL 26	AUG 15	SEP 29	NOV 22	MEAN	ST. DEV.

112	1,0	202.	202.	****	198.	****	192.	192.	195.	197.	4.58
112	11,0	205.	202.	****	198.	****	195.	192.	194.	198.	5.01

501	1,0	202.	202.	****	198.	****	192.	192.	195.	197.	4.58
501	12,0	202.	202.	****	202.	****	192.	190.	195.	197.	5.53

518	3,0	208.	202.	****	198.	****	192.	189.	197.	198.	6.83

648	1,0	202.	202.	****	198.	****	192.	190.	194.	196.	5.13
648	7,0	202.	202.	****	198.	****	192.	190.	194.	196.	5.13

810	1,0	205.	202.	****	202.	****	192.	187.	198.	198.	6.89
810	8,0	205.	202.	****	198.	****	192.	187.	196.	197.	6.56

994	1,0	205.	202.	****	198.	****	192.	189.	194.	197.	6.12
994	7,0	205.	202.	****	198.	****	192.	192.	194.	197.	5.46

1016	1,0	208.	202.	****	198.	****	192.	189.	195.	197.	6.92
1016	9,0	205.	202.	****	198.	****	192.	189.	194.	197.	6.12

1040	3,0	208.	202.	****	198.	****	192.	189.	198.	198.	6.82

1041	1,0	205.	202.	****	198.	****	192.	189.	195.	197.	6.05
1041	9,0	205.	202.	****	198.	****	195.	189.	196.	198.	5.61

1042	2,0	205.	205.	****	****	****	192.	189.	197.	198.	7.34

MEAN	SURFACE	205.	202.	****	198.	****	192.	190.	196.	197.	5.70
	BOTTOM	204.	202.	****	199.	****	193.	190.	195.	197.	5.25

ST DEV	SURFACE	2.45	0.95	*****	1.33	*****	0.0	1.51	1.55	197.	5.49
	BOTTOM	1.46	0.0	*****	1.51	*****	1.46	1.77	0.95	****	*****

**** MEANS THAT THE RESULT IS NOT AVAILABLE

APPENDIX I, TABLE 4, NANTICKE 1977

CHLORIDE MG/L

STATION	DEPTH M	APR 20	MAY 24	JUN 14	JUL 6	JUL 26	AUG 15	SEP 29	NOV 22	MEAN	ST. DEV.
112	1.0	21.0	21.0	21.0	20.5	20.5	21.5	20.5	21.0	20.9	0.35
112	11.0	21.0	21.0	21.0	20.5	21.0	21.5	20.5	21.0	20.9	0.32
501	1.0	20.5	20.5	21.0	20.5	20.5	21.5	20.5	21.0	20.8	0.38
501	12.0	20.5	21.0	21.0	20.5	20.5	21.5	20.5	21.0	20.8	0.37
518	3.0	21.0	21.0	21.0	20.5	20.5	21.5	18.5	21.0	20.6	0.92
648	1.0	21.0	21.0	21.0	20.5	20.5	21.5	20.0	21.0	20.8	0.46
648	7.0	21.0	21.0	21.0	20.5	21.0	21.5	20.0	21.0	20.9	0.44
810	1.0	21.0	21.0	21.0	20.5	20.5	21.5	18.5	21.0	20.6	0.92
810	8.0	21.0	21.0	21.0	20.5	20.5	21.5	19.5	21.0	20.8	0.60
994	1.0	20.5	21.0	21.0	20.5	20.5	21.5	20.0	20.5	20.7	0.46
994	7.0	20.5	21.0	21.0	20.5	20.5	21.5	20.0	21.0	20.8	0.46
1016	1.0	21.0	21.0	20.5	20.5	20.5	21.5	20.5	21.0	20.8	0.37
1016	9.0	21.0	21.0	21.0	20.5	20.5	21.5	20.0	21.0	20.8	0.46
1040	3.0	21.0	21.0	21.0	20.5	20.5	21.5	19.0	21.0	20.7	0.75
1041	1.0	21.0	21.5	21.0	20.5	20.5	21.5	20.0	21.0	20.9	0.52
1041	9.0	21.0	20.5	21.0	20.5	20.5	21.5	19.5	21.0	20.7	0.59
1042	2.0	21.0	20.5	21.0	****	20.5	21.5	20.0	21.0	20.8	0.49
MEAN	SURFACE	20.9	20.9	20.9	20.5	20.5	21.5	19.0	20.9	20.8	0.57
	BOTTOM	20.9	20.9	21.0	20.5	20.6	21.5	20.0	21.0	20.8	0.45
ST DEV	SURFACE	0.21	0.28	0.16	0.0	0.0	0.0	0.79	0.16	20.8	0.52
	BOTTOM	0.24	0.19	0.0	0.0	0.24	0.0	0.41	0.0	****	*****

**** MEANS THAT THE RESULT IS NOT AVAILABLE

APPENDIX I, TABLE 5, NANTICOKE 1977

SULPHATE MG/L

STATION	DEPTH M	APR 20	MAY 24	JUN 14	JUL 6	JUL 26	AUG 15	SEP 29	NOV 22	MEAN	ST.DEV.
112	1.0	26.0	24.0	****	24.0	****	25.0	24.5	25.5	24.8	0.82
112	11.0	26.0	23.5	****	24.5	****	25.5	24.0	25.5	24.8	0.98
501	1.0	26.0	24.0	****	24.5	****	25.5	24.5	26.0	25.1	0.86
501	12.0	26.0	24.0	****	24.5	****	25.5	24.5	25.5	25.0	0.77
518	3.0	26.5	24.0	****	24.5	****	25.5	25.0	26.0	25.3	0.94
648	1.0	26.0	24.0	****	24.5	****	25.0	24.5	25.5	24.9	0.74
648	7.0	26.0	23.5	****	24.0	****	25.0	24.5	25.5	24.8	0.94
810	1.0	26.0	24.0	****	26.0	****	25.5	25.0	26.5	25.5	0.89
810	8.0	25.5	23.5	****	23.5	****	25.0	24.5	25.5	24.6	0.92
994	1.0	27.0	24.0	****	24.0	****	24.5	24.0	25.5	24.8	1.21
994	7.0	27.0	23.5	****	24.0	****	25.5	25.5	25.5	25.2	1.25
1016	1.0	27.0	24.0	****	24.0	****	25.0	24.5	25.5	25.0	1.14
1016	9.0	25.5	23.5	****	24.0	****	25.0	24.5	25.5	24.7	0.82
1040	3.0	26.5	24.0	****	24.5	****	25.0	25.0	26.5	25.3	1.04
1041	1.0	26.0	24.0	****	24.0	****	25.0	24.5	26.0	24.9	0.92
1041	9.0	26.0	24.0	****	24.0	****	25.0	25.0	26.0	25.0	0.89
1042	2.0	26.5	23.5	****	****	****	25.5	24.5	26.5	25.3	1.30
MEAN	SURFACE	26.3	23.9	****	24.4	****	25.1	24.6	25.9	25.1	0.94
	BOTTOM	26.0	23.6	****	24.1	****	25.2	24.0	25.6	24.9	0.90
ST DEV	SURFACE	0.41	0.16	*****	0.63	*****	0.34	0.32	0.44	25.0	0.92
	BOTTOM	0.50	0.24	*****	0.35	*****	0.27	0.48	0.19	****	*****

**** MEANS THAT THE RESULT IS NOT AVAILABLE

APPENDIX I, TABLE 6 , NANTICUKE 1977

TURBIDITY FTU

STATION	DEPTH M	APR 20	MAY 24	JUN 14	JUL 6	JUL 26	AUG 15	SEP 29	NOV 22	MEAN	ST. DEV.
112	1.0	1.4	0.6	****	1.2	1.0	1.5	1.4	0.2	1.1	0.45
112	11.0	1.6	1.2	****	0.8	1.5	1.8	1.5	0.2	1.2	0.55
501	1.0	1.8	0.8	****	0.8	1.0	1.5	0.8	1.3	1.1	0.45
501	12.0	1.8	1.2	****	2.2	2.8	1.5	0.8	2.1	1.8	0.57
518	3.0	1.6	1.2	****	3.2	1.8	3.8	24.0	13.0	6.6	8.58
648	1.0	1.4	0.7	****	1.5	1.2	1.5	1.2	2.5	1.4	0.55
648	7.0	1.1	1.2	****	1.6	1.0	1.6	1.2	2.4	1.4	0.48
810	1.0	1.4	1.0	****	3.4	2.0	2.8	22.0	3.9	5.2	7.47
810	8.0	1.6	1.2	****	1.6	1.6	4.2	18.0	3.3	4.5	6.05
994	1.0	2.1	1.2	****	1.8	1.4	1.2	2.8	2.8	1.6	0.70
994	7.0	1.9	1.4	****	2.5	2.0	1.5	5.5	3.4	2.5	1.45
1016	1.0	1.6	1.2	****	2.0	3.8	2.4	4.2	1.9	2.4	1.13
1016	9.0	1.6	1.2	****	1.6	2.4	2.6	16.0	2.9	4.1	5.31
1040	3.0	2.0	1.4	****	3.2	2.4	3.2	26.0	2.6	5.6	8.92
1041	1.0	1.4	2.2	****	3.6	2.6	1.5	8.6	2.1	3.1	2.52
1041	9.0	1.5	1.2	****	3.8	4.4	5.8	27.0	2.0	6.5	9.18
1042	2.0	1.8	2.3	****	****	3.5	4.8	13.0	1.6	4.5	4.33
MEAN	SURFACE	1.6	1.3	****	2.3	2.1	2.4	10.4	3.2	3.3	4.97
	BOTTOM	1.6	1.2	****	2.0	2.2	2.7	10.0	2.3	3.2	4.73
ST DEV	SURFACE	0.26	0.57	*****	1.06	1.00	1.21	10.15	3.58	3.3	4.85
	BOTTOM	0.25	0.08	*****	0.94	1.12	1.67	10.36	1.09	****	*****

**** MEANS THAT THE RESULT IS NOT AVAILABLE

APPENDIX 1, TABLE 7, NANTICOKE 1977

SECCHI DISC DEPTH M

STATION	DEPTH	APR 20	MAY 24	JUN 14	JUL 6	JUL 26	AUG 15	SEP 29	NOV 22	MEAN	ST. DEV.
	M										
112	1.0	3.5	6.5	3.0	2.6	2.5	4.8	3.5	2.2	3.6	1.43
112	11.0	****	****	****	****	****	****	****	****	****	****
501	1.0	2.2	****	4.0	4.2	3.0	4.3	4.0	2.1	3.5	1.04
501	12.0	****	****	****	****	****	****	****	****	****	****
518	3.0	2.5	4.0	3.0	1.0	1.0	1.3	0.5	0.9	1.8	1.24
648	1.0	3.8	6.3	4.0	2.2	2.0	4.7	3.5	1.1	3.4	1.66
648	7.0	****	****	****	****	****	****	****	****	****	****
810	1.0	2.0	3.9	3.0	1.3	1.0	1.8	0.5	0.8	1.8	1.23
810	8.0	****	****	****	****	****	****	****	****	****	****
994	1.0	2.3	4.7	3.0	2.1	1.5	4.0	2.0	1.2	2.6	1.22
994	7.0	****	****	****	****	****	****	****	****	****	****
1016	1.0	2.5	5.0	2.5	1.9	1.5	2.6	1.3	****	2.5	1.23
1016	9.0	****	****	****	****	****	****	****	****	****	****
1040	3.0	2.5	3.3	2.5	1.5	1.0	1.7	0.5	2.5	1.9	0.97
1041	1.0	2.7	3.4	2.7	1.2	1.0	2.3	0.7	****	2.0	1.03
1041	9.0	****	****	****	****	****	****	****	****	****	****
1042	2.0	2.5	2.5	2.5	1.2	1.0	1.4	0.7	****	1.7	0.79
MEAN	SURFACE	2.7	4.4	3.0	1.9	1.5	2.9	1.7	1.5	2.5	1.36
	BOTTOM	****	****	****	****	****	****	****	****	****	****
ST DEV	SURFACE	0.52	1.36	0.56	0.96	0.72	1.41	1.58	0.70	2.5	1.36
	BOTTOM	****	****	****	****	****	****	****	****	****	****

**** MEANS THAT THE RESULT IS NOT AVAILABLE

APPENDIX I, TABLE 8 , NANTICOKE 1977

SUSPENDED SOLIDS MG/L

STATION	DEPTH M	APR 20	MAY 24	JUN 14	JUL 6	JUL 26	AUG 15	SEP 29	NOV 22	MEAN	ST.DEV.

112	1.0	2.0	0.8	****	1.5	****	1.8	1.9	6.5	2.4	2.05
112	11.0	2.0	1.7	****	1.8	****	2.3	1.7	5.9	2.6	1.65
501	1.0	2.0	1.5	****	0.8	****	7.1	0.8	5.4	2.9	2.66
501	12.0	2.0	1.4	****	3.3	****	2.0	1.1	8.9	3.1	2.93
518	3.0	3.0	1.6	****	4.4	****	5.0	13.0	8.7	5.9	4.20
648	1.0	1.0	0.6	****	1.7	****	1.5	1.0	7.0	2.2	2.37
648	7.0	2.0	2.5	****	2.2	****	2.3	1.4	6.0	2.7	1.64
810	1.0	2.0	1.3	****	4.9	****	3.4	13.0	10.0	5.8	4.71
810	8.0	2.0	1.7	****	2.7	****	6.4	12.0	8.3	5.5	4.13
994	1.0	3.0	1.7	****	2.1	****	2.0	3.1	11.0	3.8	3.56
994	7.0	3.0	1.5	****	3.3	****	2.8	4.4	8.7	3.9	2.51
1016	1.0	2.0	1.1	****	2.7	****	2.5	4.3	3.6	2.7	1.14
1016	9.0	2.0	1.4	****	2.4	****	3.5	8.3	9.2	4.5	3.40
1040	3.0	2.0	1.6	****	5.2	****	5.2	13.0	8.9	6.0	4.34
1041	1.0	2.0	5.4	****	5.5	****	1.6	8.7	6.3	4.9	2.69
1041	9.0	2.0	1.3	****	5.5	****	8.8	24.0	9.3	8.5	8.30
1042	2.0	2.0	2.9	****	****	****	6.4	9.8	6.4	5.5	3.13

MEAN	SURFACE	2.1	1.8	****	3.2	****	3.6	6.9	7.4	4.2	3.36
	BOTTOM	2.1	1.6	****	3.0	****	4.0	7.0	8.0	4.4	4.26
ST DEV	SURFACE	0.57	1.39	*****	1.80	*****	2.11	5.11	2.24	4.3	3.74
	BOTTOM	0.38	0.41	*****	1.22	*****	2.59	8.31	1.47	****	*****

**** MEANS THAT THE RESULT IS NOT AVAILABLE

APPENDIX I, TABLE 9, NANTICUKE 1977

CHLOROPHYLL A UG/L

STATION	DEPTH	APR 20	MAY 24	JUN 14	JUL 6	JUL 26	AUG 15	SEP 29	NOV 22	MEAN	ST.DEV.
	M										
112	1.0	1.0	1.1	1.1	0.7	1.0	1.1	0.9	3.0	1.2	0.72
112	11.0	***	***	***	***	***	***	***	***	***	***
501	1.0	1.0	1.1	1.4	0.6	1.2	1.6	1.0	2.8	1.3	0.66
501	12.0	***	***	***	***	***	***	***	***	***	***
518	3.0	4.7	1.2	1.2	1.0	2.1	1.2	1.5	3.3	2.0	1.33
648	1.0	2.1	1.3	1.4	0.9	1.7	1.1	0.6	3.3	1.5	0.85
648	7.0	***	***	***	***	***	***	***	***	***	***
810	1.0	3.5	1.4	1.6	1.3	1.4	1.8	1.2	3.8	2.0	1.04
810	8.0	***	***	***	***	***	***	***	***	***	***
994	1.0	2.1	1.3	1.5	0.8	1.3	1.2	0.4	3.3	1.5	0.88
994	7.0	***	***	***	***	***	***	***	***	***	***
1016	1.0	1.2	1.3	1.2	2.9	1.3	1.4	0.7	3.0	1.6	0.84
1016	9.0	***	***	***	***	***	***	***	***	***	***
1040	3.0	5.8	1.3	1.2	1.6	1.1	1.1	0.9	3.7	2.1	1.75
1041	1.0	1.3	1.3	1.3	5.7	***	1.2	1.2	3.1	2.2	1.71
1041	9.0	***	***	***	***	***	***	***	***	***	***
1042	2.0	2.0	0.7	1.4	4.9	1.3	1.1	1.5	3.4	2.0	1.41
MEAN	SURFACE	2.5	1.2	1.3	2.0	1.4	1.5	1.0	3.3	1.7	1.15
	BOTTOM	***	***	***	***	***	***	***	***	***	***
ST DEV	SURFACE	1.66	0.20	0.16	1.85	0.33	0.24	0.34	0.31	1.7	1.15
	BOTTOM	***	***	***	***	***	***	***	***	***	***

*** MEANS THAT THE RESULT IS NOT AVAILABLE

APPENDIX I, TABLE 10 , NANTICKE 1977

DISSOLVED OXYGEN % SATURATION

STATION	DEPTH M	APR 20	MAY 24	JUN 14	JUL 6	JUL 26	AUG 15	SEP 29	NOV 22	MEAN	ST.DEV.
112	1.0	88.	118.	****	****	****	****	****	****	103.	21.21
112	11.0	80.	100.	****	****	****	****	****	****	90.	14.14
501	1.0	92.	117.	****	****	****	****	****	****	105.	17.68
501	12.0	82.	103.	****	****	****	****	****	****	95.	14.85
518	3.0	****	115.	****	****	****	****	****	****	115.	****
648	1.0	****	116.	****	****	****	****	****	****	116.	****
648	7.0	****	108.	****	****	****	****	****	****	108.	****
810	1.0	****	121.	****	****	****	****	****	****	121.	****
810	8.0	****	110.	****	****	****	****	****	****	110.	****
994	1.0	99.	119.	****	****	****	****	****	****	109.	14.14
994	7.0	92.	106.	****	****	****	****	****	****	99.	9.90
1016	1.0	102.	121.	****	****	****	****	****	****	112.	13.44
1016	9.0	88.	103.	****	****	****	****	****	****	96.	10.61
1040	3.0	89.	115.	****	****	****	****	****	****	102.	18.38
1041	1.0	102.	119.	****	****	****	****	****	****	111.	12.02
1041	9.0	94.	100.	****	****	****	****	****	****	97.	4.24
1042	2.0	104.	118.	****	****	****	****	****	****	111.	9.90
MEAN	SURFACE	97.	118.	****	****	****	****	****	****	109.	11.69
	BOTTOM	87.	104.	****	****	****	****	****	****	97.	9.95
ST DEV	SURFACE	6.73	2.18	****	****	****	****	****	****	104.	12.37
	BOTTOM	6.10	3.86	****	****	****	****	****	****	****	****

**** MEANS THAT THE RESULT IS NOT AVAILABLE

APPENDIX I, TABLE 11 , NANTICUKE 1977

BOD5 MG/L

STATION	DEPTH M	APR 20	MAY 24	JUN 14	JUL 6	JUL 26	AUG 15	SEP 29	NOV 22	MEAN	ST.DEV.
112	1.0	0.6	0.2	****	****	****	0.2	0.4	0.2	0.3	0.18
112	11.0	1.5	0.8	****	****	****	0.2	0.4	0.2	0.6	0.55
501	1.0	0.6	0.4	****	****	****	0.2	0.4	0.2	0.4	0.17
501	12.0	0.4	0.6	****	****	****	0.2	0.5	0.2	0.4	0.18
518	3.0	1.4	0.2	****	****	****	0.2	0.0	0.2	0.5	0.52
648	1.0	1.4	0.2	****	****	****	0.8	0.8	0.2	0.6	0.50
648	7.0	0.6	0.6	****	****	****	0.2	0.5	0.2	0.4	0.20
810	1.0	1.0	0.2	****	****	****	0.4	0.8	0.2	0.5	0.33
810	8.0	0.6	0.6	****	****	****	0.2	0.5	0.2	0.4	0.20
994	1.0	0.8	0.4	****	****	****	0.2	0.4	0.2	0.4	0.24
994	7.0	0.8	0.6	****	****	****	0.2	0.4	0.2	0.4	0.26
1016	1.0	0.8	0.4	****	****	****	0.2	0.5	0.6	0.5	0.22
1016	9.0	0.6	0.2	****	****	****	0.2	0.4	0.2	0.3	0.18
1040	3.0	0.8	0.4	****	****	****	0.2	0.4	0.2	0.4	0.24
1041	1.0	0.8	0.4	****	****	****	0.2	0.8	0.2	0.4	0.26
1041	9.0	0.8	0.4	****	****	****	0.2	0.4	0.2	0.4	0.24
1042	2.0	1.0	0.8	****	****	****	0.4	0.4	0.2	0.6	0.33
MEAN	SURFACE	0.9	0.4	****	****	****	0.5	0.5	0.2	0.5	0.31
	BOTTOM	0.8	0.5	****	****	****	0.2	0.4	0.2	0.4	0.28
ST DEV	SURFACE	0.29	0.18	****	****	****	0.19	0.10	0.13	0.4	0.29
	BOTTOM	0.36	0.19	****	****	****	0.00	0.05	0.00	****	****

**** MEANS THAT THE RESULT IS NOT AVAILABLE

APPENDIX I, TABLE 12, NANTICOKE 1977

TOTAL P MG/L

STATION	DEPTH M	APR 20	MAY 24	JUN 14	JUL 6	JUL 26	AUG 15	SEP 29	NOV 22	MEAN	ST. DEV.
*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****
112	1.0	0.012	0.003	0.006	0.011	0.011	0.009	0.020	0.021	0.012	0.0062
112	11.0	0.014	0.013	0.010	0.017	0.018	0.020	0.017	0.015	0.015	0.0032
501	1.0	0.015	0.006	0.008	0.008	0.013	0.017	0.015	0.013	0.012	0.0040
501	12.0	0.010	0.011	0.009	0.009	0.011	0.017	0.011	0.047	0.026	0.0286
518	3.0	0.013	0.002	0.009	0.014	0.014	0.018	0.054	0.023	0.018	0.0156
648	1.0	0.015	0.002	0.005	0.009	0.014	0.015	0.010	0.014	0.011	0.0053
648	7.0	0.015	0.010	0.008	0.012	0.010	0.010	0.010	0.020	0.012	0.0039
810	1.0	0.013	0.001	0.009	0.017	0.017	0.024	0.040	0.015	0.018	0.0138
810	8.0	0.014	0.006	0.011	0.020	0.017	0.023	0.042	0.019	0.019	0.0107
994	1.0	0.014	0.006	0.007	0.012	0.014	0.012	0.021	0.020	0.013	0.0054
994	7.0	0.015	0.011	0.017	0.023	0.010	0.018	0.025	0.015	0.017	0.0053
1016	1.0	0.015	0.005	0.009	0.014	0.026	0.015	0.019	0.013	0.014	0.0063
1016	9.0	0.017	0.012	0.018	0.017	0.015	0.025	0.042	0.013	0.020	0.0098
1040	3.0	0.014	0.013	0.011	0.022	0.016	0.024	0.053	0.024	0.022	0.0135
1041	1.0	0.012	0.005	0.010	0.016	0.023	0.029	0.036	0.013	0.018	0.0105
1041	9.0	0.025	0.009	0.009	0.019	0.019	0.009	0.057	0.013	0.020	0.0161
1042	2.0	0.016	0.004	0.009	*****	0.019	0.017	0.045	0.059	0.024	0.0201
*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****
MEAN	SURFACE	0.014	0.005	0.008	0.014	0.017	0.018	0.033	0.021	0.016	0.0113
	BOTTOM	0.016	0.010	0.012	0.028	0.014	0.017	0.029	0.020	0.018	0.0137
ST DEV	SURFACE	0.0014	0.0034	0.0018	0.0043	0.0047	0.0061	0.0161	0.0139	0.017	0.0123
	BOTTOM	0.0046	0.0023	0.0041	0.0270	0.0039	0.0061	0.0181	0.0121	*****	*****

**** MEANS THAT THE RESULT IS NOT AVAILABLE

APPENDIX I, TABLE 13, NANTICOKE 1977

FILTERED REACTIVE P MG/L

STATION	DEPTH M	APR 20	MAY 24	JUN 14	JUL 6	JUL 26	AUG 15	SEP 29	NOV 22	MEAN	ST. DEV.

112	1.0	0.003	0.002	0.001	0.005	0.002	0.005	0.005	0.005	0.003	0.0016
112	11.0	0.002	0.004	0.002	0.006	0.004	0.006	0.006	0.002	0.004	0.0019

501	1.0	0.003	0.006	0.002	0.003	0.003	0.007	0.001	0.002	0.003	0.0021
501	12.0	0.002	0.004	0.003	0.004	0.003	0.006	0.001	0.024	0.006	0.0075

518	3.0	0.002	0.002	0.001	0.004	0.002	0.001	0.017	0.004	0.004	0.0053

648	1.0	0.002	0.001	0.001	0.003	0.003	0.007	0.002	0.002	0.003	0.0019
648	7.0	0.002	0.003	0.001	0.004	0.003	0.009	0.002	0.002	0.003	0.0025

810	1.0	0.003	0.002	0.001	0.004	0.003	0.003	0.016	0.002	0.004	0.0048
810	8.0	0.002	0.003	0.001	0.006	0.003	0.015	0.014	0.002	0.006	0.0056

994	1.0	0.002	0.005	0.001	0.004	0.003	0.004	0.002	0.002	0.003	0.0014
994	7.0	0.002	0.005	0.002	0.006	0.003	0.006	0.004	0.002	0.004	0.0018

1016	1.0	0.002	0.001	0.002	0.002	0.004	0.004	0.004	0.002	0.003	0.0012
1016	9.0	0.003	0.003	0.004	0.005	0.004	0.007	0.037	0.003	0.008	0.0117

1040	3.0	0.005	0.006	0.001	0.004	0.003	0.009	0.021	0.005	0.007	0.0062

1041	1.0	0.002	0.002	0.002	0.004	0.003	0.003	0.006	0.001	0.003	0.0016
1041	9.0	0.009	0.003	0.001	0.003	0.004	0.008	0.014	0.013	0.007	0.0049

1042	2.0	0.003	0.004	0.001	*****	0.004	0.005	0.011	0.006	0.005	0.0031

MEAN	SURFACE	0.003	0.003	0.001	0.004	0.003	0.005	0.006	0.003	0.004	0.0034
	BOTTOM	0.003	0.004	0.002	0.005	0.003	0.008	0.011	0.007	0.005	0.0060

ST DEV	SURFACE	0.0009	0.0020	0.0005	0.0009	0.0007	0.0023	0.0074	0.0017	0.004	0.0047
	BOTTOM	0.0026	0.0008	0.0012	0.0012	0.0005	0.0032	0.0120	0.0086	*****	*****

**** MEANS THAT THE RESULT IS NOT AVAILABLE

APPENDIX 1, TABLE 14 , NANTICOKE 1977

TOTAL KJELDAHL N MG N/L

STATION	DEPTH M	APR 20	MAY 24	JUN 14	JUL 6	JUL 26	AUG 15	SEP 29	NOV 22	MEAN	ST. DEV.

112	1.0	0.250	0.180	0.200	0.240	0.260	0.230	0.360	0.220	0.242	0.0542
112	11.0	0.230	0.330	0.220	0.290	1.010	0.280	0.310	0.220	0.361	0.2655
501	1.0	0.240	0.200	0.300	0.210	0.260	0.220	0.320	0.210	0.245	0.0447
501	12.0	0.225	0.260	0.230	0.290	0.250	0.250	0.310	0.210	0.253	0.0335
518	3.0	0.250	0.210	0.210	0.260	0.300	0.026	0.430	0.230	0.239	0.1121
648	1.0	0.245	0.210	0.200	0.230	0.320	0.230	0.360	0.210	0.251	0.0580
648	7.0	0.240	0.210	0.210	0.260	0.330	0.220	0.290	0.230	0.249	0.0426
810	1.0	0.290	0.240	0.210	0.280	0.350	0.240	0.420	0.220	0.281	0.0720
810	8.0	0.270	0.230	0.230	0.290	0.300	0.250	0.380	0.220	0.271	0.0528
994	1.0	0.250	0.210	0.180	0.230	0.280	0.230	0.360	0.230	0.246	0.0542
994	7.0	0.260	0.260	0.300	0.280	0.300	0.230	0.350	0.220	0.275	0.0421
1016	1.0	0.260	0.180	0.260	0.260	0.540	0.210	0.330	0.220	0.282	0.1132
1016	9.0	0.255	0.230	0.360	0.280	0.310	0.250	0.340	0.240	0.283	0.0485
1040	3.0	0.315	0.250	0.300	0.300	0.340	0.270	0.390	0.220	0.298	0.0530
1041	1.0	0.250	0.180	0.220	0.250	0.370	0.290	0.400	0.220	0.272	0.0767
1041	9.0	0.300	0.240	0.220	0.300	0.360	0.210	0.480	0.220	0.291	0.0925
1042	2.0	0.260	0.210	0.180	*****	0.350	0.250	0.440	0.260	0.279	0.0886

MEAN	SURFACE	0.261	0.207	0.226	0.251	0.337	0.220	0.381	0.224	0.263	0.0745
	BOTTOM	0.254	0.251	0.253	0.284	0.409	0.241	0.351	0.223	0.283	0.1120
ST DEV	SURFACE	0.0234	0.0241	0.0450	0.0276	0.0812	0.0721	0.0415	0.0143	0.272	0.0920
	BOTTOM	0.0259	0.0389	0.0559	0.0127	0.2673	0.0234	0.0641	0.0095	*****	*****

*** MEANS THAT THE RESULT IS NOT AVAILABLE

APPENDIX 1, TABLE 15 , NANTICOKE 1977

FILTERED NO2+NO3 MG N/L

STATION	DEPTH M	APR 20	MAY 24	JUN 14	JUL 6	JUL 26	AUG 15	SEP 29	NOV 22	MEAN	ST.DEV.

112	1.0	0.195	0.110	0.120	0.095	0.070	0.050	0.070	0.120	0.104	0.0449
112	11.0	0.190	0.155	0.145	0.095	0.110	0.090	0.070	0.120	0.122	0.0394

501	1.0	0.195	0.105	0.090	0.085	0.070	0.050	0.060	0.112	0.096	0.0453
501	12.0	0.195	0.155	0.125	0.125	0.115	0.050	0.060	0.110	0.117	0.0470

518	3.0	0.130	0.120	0.110	0.105	0.095	0.060	0.200	0.163	0.123	0.0428

648	1.0	0.180	0.110	0.110	0.085	0.075	0.050	0.045	0.110	0.096	0.0430
648	7.0	0.185	0.135	0.115	0.090	0.080	0.050	0.040	0.120	0.102	0.0473

810	1.0	0.140	0.125	0.115	0.100	0.090	0.050	0.185	0.140	0.118	0.0401
810	8.0	0.150	0.140	0.115	0.095	0.090	0.050	0.155	0.130	0.116	0.0357

994	1.0	0.140	0.140	0.095	0.105	0.090	0.060	0.070	0.110	0.101	0.0291
994	7.0	0.135	0.130	0.115	0.110	0.110	0.060	0.100	0.110	0.109	0.0228

1016	1.0	0.145	0.130	0.115	0.095	0.090	0.050	0.070	0.110	0.101	0.0311
1016	9.0	0.150	0.160	0.130	0.105	0.105	0.050	0.125	0.110	0.117	0.0338

1040	3.0	0.140	0.140	0.115	0.095	0.095	0.050	0.210	0.140	0.123	0.0469

1041	1.0	0.140	0.120	0.115	0.100	0.100	0.055	0.090	0.120	0.105	0.0255
1041	9.0	0.170	0.155	0.110	0.105	0.100	0.060	0.145	0.120	0.121	0.0352

1042	2.0	0.145	0.130	0.100	*****	0.100	0.075	0.120	0.120	0.113	0.0231

MEAN	SURFACE	0.155	0.123	0.108	0.096	0.087	0.055	0.112	0.124	0.108	0.0374
	BOTTOM	0.168	0.147	0.122	0.104	0.101	0.059	0.099	0.117	0.115	0.0366

ST DEV	SURFACE	0.0248	0.0123	0.0100	0.0074	0.0116	0.0082	0.0630	0.0177	0.111	0.0371
	BOTTOM	0.0232	0.0119	0.0122	0.0118	0.0125	0.0146	0.0443	0.0076	*****	*****

**** MEANS THAT THE RESULT IS NOT AVAILABLE

APPENDIX I, TABLE 16, NANTICUKE 1977

FILTERED NH3 MG N/L

STATION	DEPTH M	APR 20	MAY 24	JUN 14	JUL 6	JUL 26	AUG 15	SEP 29	NOV 22	MEAN	ST. DEV.
112	1.0	0.004	0.004	0.006	0.008	0.014	0.012	0.012	0.016	0.009	0.0046
112	11.0	0.002	0.014	0.016	0.018	0.048	0.018	0.010	0.020	0.018	0.0135
501	1.0	0.004	0.006	0.014	0.010	0.014	0.010	0.006	0.016	0.010	0.0044
501	12.0	0.004	0.014	0.012	0.030	0.034	0.012	0.006	0.022	0.017	0.0109
518	3.0	0.004	0.004	0.004	0.016	0.020	0.008	0.028	0.018	0.013	0.0091
648	1.0	0.002	0.004	0.004	0.004	0.012	0.012	0.006	0.020	0.008	0.0061
648	7.0	0.002	0.008	0.004	0.006	0.010	0.012	0.008	0.022	0.009	0.0061
810	1.0	0.012	0.006	0.006	0.014	0.022	0.016	0.024	0.018	0.015	0.0067
810	8.0	0.004	0.006	0.004	0.014	0.020	0.018	0.024	0.020	0.014	0.0080
994	1.0	0.004	0.008	0.004	0.006	0.020	0.014	0.006	0.026	0.011	0.0081
994	7.0	0.004	0.008	0.014	0.026	0.030	0.012	0.010	0.020	0.015	0.0091
1016	1.0	0.004	0.002	0.010	0.002	0.020	0.010	0.006	0.024	0.010	0.0081
1016	9.0	0.002	0.006	0.024	0.018	0.034	0.014	0.020	0.026	0.018	0.0105
1040	3.0	0.004	0.004	0.008	0.012	0.026	0.012	0.026	0.018	0.014	0.0088
1041	1.0	0.004	0.002	0.006	0.004	0.030	0.008	0.010	0.022	0.011	0.0100
1041	9.0	0.028	0.006	0.006	0.028	0.030	0.018	0.022	0.016	0.019	0.0096
1042	2.0	0.004	0.006	0.004	*****	0.032	0.016	0.016	0.020	0.014	0.0104
MEAN	SURFACE	0.005	0.005	0.007	0.008	0.021	0.012	0.015	0.020	0.011	0.0077
	BOTTOM	0.007	0.009	0.011	0.020	0.029	0.015	0.014	0.021	0.016	0.0099
ST DEV	SURFACE	0.0027	0.0019	0.0033	0.0049	0.0067	0.0029	0.0086	0.0033	0.013	0.0089
	BOTTOM	0.0095	0.0036	0.0074	0.0086	0.0119	0.0030	0.0074	0.0030	*****	*****

***** MEANS THAT THE RESULT IS NOT AVAILABLE

APPENDIX I, TABLE 17 , NANTICOKE 1977

PH AT LAB

STATION	DEPTH M	APR 20	MAY 24	JUN 14	JUL 6	JUL 26	AUG 15	SEP 29	NOV 22	MEAN	ST. DEV.
112	1.0	8.10	8.37	****	8.21	****	8.35	****	8.23	8.25	0.111
112	11.0	8.07	8.06	****	8.08	****	8.11	8.10	8.32	8.12	0.099
501	1.0	8.10	8.32	****	8.08	****	8.29	8.15	8.22	8.19	0.102
501	12.0	8.10	8.09	****	7.86	****	8.28	****	8.22	8.11	0.162
518	3.0	8.34	8.32	****	8.05	****	8.27	8.15	8.33	8.24	0.118
648	1.0	8.14	8.31	****	8.23	****	8.36	8.25	8.29	8.26	0.077
648	7.0	8.15	8.18	****	8.13	****	8.37	8.14	8.35	8.22	0.110
810	1.0	8.30	8.32	****	8.07	****	8.39	7.85	8.30	8.20	0.205
810	8.0	8.33	8.10	****	7.92	****	8.14	8.20	8.27	8.16	0.144
994	1.0	8.30	8.29	****	7.78	****	8.06	7.90	8.11	8.09	0.197
994	7.0	8.34	8.12	****	7.71	****	8.24	8.14	8.26	8.13	0.224
1016	1.0	8.41	8.40	****	8.20	****	8.33	8.25	8.15	8.29	0.109
1016	9.0	8.35	8.20	****	8.14	****	8.35	****	8.18	8.24	0.099
1040	3.0	8.31	8.20	****	8.05	****	8.25	8.19	8.36	8.23	0.108
1041	1.0	8.36	8.50	****	8.18	****	8.26	8.15	8.17	8.27	0.137
1041	9.0	8.31	8.10	****	7.98	****	8.25	8.05	8.22	8.15	0.125
1042	2.0	8.23	8.30	****	****	****	8.36	8.21	8.27	8.27	0.061
MEAN	SURFACE	8.26	8.33	****	8.09	****	8.29	8.12	8.24	8.23	0.136
	BOTTOM	8.24	8.12	****	7.97	****	8.25	8.13	8.26	8.16	0.142
ST DEV	SURFACE	0.111	0.079	****	0.139	****	0.095	0.126	0.082	8.20	0.141
	BOTTOM	0.124	0.051	****	0.158	****	0.098	0.050	0.061	****	****

**** MEANS THAT THE RESULT IS NOT AVAILABLE

APPENDIX I, TABLE 18 , NANTICUKE 1977

TOTAL ALKALINITY MG/L

STATION	DEPTH M	APR 20	MAY 24	JUN 14	JUL 6	JUL 26	AUG 15	SEP 29	NOV 22	MEAN	ST.DEV.
112	1.0	***	970.	***	950.	***	940.	950.	970.	967.	28.75
112	11.0	970.	960.	***	950.	***	960.	960.	970.	962.	7.54
501	1.0	980.	980.	***	950.	***	940.	970.	970.	965.	16.44
501	12.0	990.	960.	***	960.	***	940.	940.	980.	962.	20.42
518	3.0	***	970.	***	950.	***	950.	940.	990.	967.	24.22
648	1.0	970.	970.	***	950.	***	940.	950.	970.	958.	13.30
648	7.0	***	970.	***	950.	***	940.	950.	980.	967.	25.82
810	1.0	***	960.	***	960.	***	940.	940.	990.	965.	25.10
810	8.0	***	960.	***	960.	***	950.	940.	990.	967.	23.38
994	1.0	970.	970.	***	960.	***	950.	950.	980.	963.	12.12
994	7.0	990.	960.	***	960.	***	940.	950.	970.	962.	17.23
1016	1.0	***	970.	***	950.	***	940.	940.	980.	965.	24.22
1016	9.0	***	970.	***	950.	***	940.	940.	980.	965.	24.22
1040	3.0	***	970.	***	950.	***	940.	970.	990.	970.	22.80
1041	1.0	***	970.	***	960.	***	940.	950.	980.	967.	21.61
1041	9.0	***	980.	***	970.	***	950.	940.	980.	970.	21.91
1042	2.0	***	970.	***	***	***	950.	970.	990.	980.	26.46
MEAN	SURFACE	996.	970.	***	953.	***	943.	953.	981.	966.	20.88
	BOTTOM	994.	966.	***	957.	***	946.	946.	979.	965.	19.52
ST DEV	SURFACE	17.76	4.71	***	5.00	***	4.84	12.52	8.76	966.	20.24
	BOTTOM	12.73	7.87	***	7.56	***	7.87	7.87	6.92	***	***

*** MEANS THAT THE RESULT IS NOT AVAILABLE

APPENDIX I, TABLE 19 , NANTICUKE 1977

TOTAL IRON MG/L

STATION	DEPTH	APR 20	MAY 24	JUN 14	JUL 6	JUL 26	AUG 15	SEP 29	NOV 22	MEAN	ST.DEV.
112	1.0	0.03	0.02	****	0.05	****	0.04	0.07	0.29	0.08	0.103
112	11.0	0.04	0.03	****	0.06	****	0.05	0.06	0.52	0.13	0.193
591	1.0	0.08	0.03	****	0.13	****	0.05	0.06	0.12	0.08	0.039
591	12.0	0.05	0.03	****	0.13	****	0.04	0.05	0.35	0.10	0.126
518	3.0	0.05	0.03	****	0.15	****	0.13	1.35	0.31	0.34	0.506
648	1.0	0.04	0.05	****	0.06	****	0.05	0.06	0.56	0.14	0.208
648	7.0	0.04	0.09	****	0.07	****	0.04	0.07	0.35	0.11	0.119
810	1.0	0.03	0.04	****	0.16	****	0.24	1.25	0.42	0.36	0.461
810	8.0	0.04	0.04	****	0.08	****	0.20	1.00	0.35	0.28	0.370
994	1.0	0.04	0.04	****	0.18	****	0.05	0.12	0.40	0.14	0.140
994	7.0	0.03	0.04	****	0.10	****	0.05	0.25	0.32	0.13	0.123
1016	1.0	0.04	0.04	****	0.08	****	0.28	0.36	0.35	0.19	0.155
1016	9.0	0.05	0.04	****	0.07	****	0.09	0.85	0.25	0.22	0.316
1040	3.0	0.08	0.05	****	0.14	****	0.10	1.40	0.65	0.40	0.538
1041	1.0	0.05	0.09	****	0.08	****	0.05	0.48	0.23	0.16	0.169
1041	9.0	0.07	0.04	****	0.16	****	0.27	1.30	0.36	0.37	0.473
1042	2.0	0.04	0.06	****	****	****	0.21	0.60	0.23	0.23	0.225
MEAN	SURFACE	0.05	0.04	****	0.11	****	0.12	0.58	0.36	0.21	0.304
	BOTTOM	0.05	0.04	****	0.10	****	0.11	0.51	0.36	0.19	0.274
ST DEV	SURFACE	0.018	0.020	****	0.047	****	0.091	0.554	0.159	0.20	0.291
	BOTTOM	0.013	0.021	****	0.037	****	0.092	0.528	0.081	****	****

**** MEANS THAT THE RESULT IS NOT AVAILABLE

APPENDIX I, TABLE 20 , NANTICOKE 1977

PHENOLS UG/L

STATION	DEPTH	APR 20	MAY 24	JUN 14	JUL 6	JUL 26	AUG 15	SEP 29	NOV 22	MEAN	ST.DEV.
	m										
112	1.0	1.0	1.0	****	1.0	****	1.0	1.0	1.0	1.0	0.0
112	11.0	1.0	1.0	****	1.0	****	1.0	2.0	2.0	1.3	0.52
501	1.0	1.0	1.0	****	1.0	****	1.0	1.0	2.0	1.2	0.41
501	12.0	1.0	1.0	****	1.0	****	2.0	1.0	1.0	1.2	0.41
518	3.0	1.0	1.0	****	1.0	****	1.0	1.0	1.0	1.0	0.0
648	1.0	1.0	1.0	****	1.0	****	1.0	2.0	2.0	1.3	0.52
648	7.0	1.0	1.0	****	1.0	****	1.0	1.0	1.0	1.0	0.0
810	1.0	1.0	1.0	****	1.0	****	1.0	2.0	1.0	1.2	0.41
810	8.0	1.0	1.0	****	2.0	****	1.0	2.0	1.0	1.3	0.52
994	1.0	1.0	1.0	****	1.0	****	2.0	6.0	1.0	2.0	2.00
994	7.0	1.0	1.0	****	2.0	****	2.0	1.0	2.0	1.5	0.55
1016	1.0	1.0	1.0	****	1.0	****	1.0	5.0	2.0	1.8	1.60
1016	9.0	1.0	1.0	****	1.0	****	1.0	4.0	1.0	1.5	1.22
1040	3.0	1.0	1.0	****	1.0	****	1.0	1.0	1.0	1.0	0.0
1041	1.0	2.0	1.0	****	2.0	****	1.0	2.0	1.0	1.5	0.55
1041	9.0	1.0	1.0	****	1.0	****	1.0	2.0	1.0	1.2	0.41
1042	2.0	1.0	1.0	****	****	****	1.0	1.0	2.0	1.2	0.45
MEAN	SURFACE	1.1	1.0	****	1.1	****	1.1	2.2	1.4	1.3	0.88
	BOTTOM	1.0	1.0	****	1.3	****	1.3	1.9	1.3	1.3	0.60
ST DEV	SURFACE	0.32	0.0	*****	0.33	*****	0.32	1.81	0.52	1.3	0.77
	BOTTOM	0.0	0.0	*****	0.49	*****	0.49	1.07	0.49	****	*****

**** MEANS THAT THE RESULT IS NOT AVAILABLE

